Strong Earthquakes Spell Trouble For America's Oil Heartland

By Irina Slav - Jan 05, 2022, 4:00 PM CST

- Strongest earthquake in 10-years stirs up debate in Texas
- The Texas Railroad Commission banned injection of wastewater from well drilling into deep wells just before the big quake
- Shutting down disposal wells cannot be a permanent decision

A week ago, an earthquake with a 4.5 magnitude struck Texas in the most prolific shale play in the country—the Permian. Days later, another quake shook America's oil heartland. And seismic activity might eventually force drillers to curb production.

The December 27 quake was the strongest in Texas for the last ten years, the Midland Reporter-Telegram reported at the time. It happened at a depth of 4.3 miles near Stanton. And it followed a series of earlier quakes in December.

In the middle of December, the U.S. Geological Survey reported four earthquakes in the vicinity of Midland that occurred within 24 hours. The magnitude of these quakes ranged from 2.9 to 3.7, which is not a whole lot, but the number was concerning, especially since it came after more tremors were detected by the University of Texas at Austin's Bureau of Economic Geology earlier in the year. And after the stronger quake, regulators have stepped in.

The Texas Railroad Commission banned the injection of wastewater from well drilling into deep wells just before the big quake. After the big quake, the commission sent out inspectors to the field as the quake had occurred in an area already under investigation for wastewater disposal in deep wells.

According to Reuters, if the inspection results in a halt of wastewater disposal in the area, this could lead to the shutdown of some 18 disposal wells that pump a combined 9,600 barrels of wastewater. And if drillers cannot dispose of wastewater, then they cannot really drill.

That hydraulic fracturing, or fracking, causes increased seismic activity has been one of the main weapons in the arsenal of anti-fracking activists. Indeed, according to the U.S. Geological Survey, the practice of splitting shale rock formation to extract the oil contained in it does cause increased seismic activity. Only it's not the fracking itself. It's the wastewater.

Fracking requires enormous amounts of liquid, and this liquid, called wastewater but in fact, a mixture of water and chemicals, needs to be disposed of. Disposal usually takes place in disposal wells, some of them quite deep to hold more wastewater. It is these underground wastewater reservoirs that have been linked to increased seismic activity in some oil regions.

Five years ago, for instance, Oklahoma drew media attention because of the significantly increased frequency of earthquakes since the start of the shale boom. The state, one of the big oil producers in the U.S., had negligible seismic activity before 2009 when fracking really took off. By 2016, Oklahoma was recording an average of two quakes a day—what was earlier the average for a year. To date, quakes are just as frequent.

According to website Earthquake Tracker, there have been 10 earthquakes in Oklahoma in the last seven days, 68 quakes in the past 30 days, and 2,063 quakes in the past year. Of course, most of these are minor, but due to their increased frequency, they can still cause—and have caused —material damage. The issue even led to litigation seeking insurance coverage against the effects of wastewater disposal from oil wells. Unfortunately for the plaintiffs in this case, the Supreme Court of Oklahoma this month ruled that no insurance coverage exists for bodily injury or property damage caused by wastewater disposal-related seismic activity.

Interestingly enough, there used to be insurance coverage for such damages until a few years ago. As seismic activity grew, Oklahoma insurers started getting increasingly aware of the fact that upping the premiums for earthquake coverage (by 200% in some cases) was not sufficient to avoid substantial losses at this rate of seismic activity. So they began removing this coverage from their

service offering and rejecting claims for quake-caused damage, attributing it instead to houses settling or just being plain too old.

The Permian is a bigger producer of oil than Oklahoma. It is the biggest producing oil region in the United States and the driver of its production growth, seen as substantial this year as prices remain comfortably high. But unless producers can find an alternative to injecting wastewater into deep wells, some of that production growth might never happen in order to avoid turning Texas into the second earthquake capital of the U.S. after Oklahoma.

The alternatives include trucking the wastewater away and disposing of it elsewhere, therefore distributing the burden of tons of water that, if dumped into an underground well, could cause heightened seismic activity. Another alternative is to recycle the water, and it might be worth motivating drillers to consider it as the amounts of water used in shale wells drilling are not going any smaller: according to the Groundwater Protection Council, a single horizontal well requires 45 million liters of water.

The U.S. oil and gas industry generates hundreds of millions of gallons of wastewater every year. This water's disposal can and does cause increased seismic activity in some places. Shutting down disposal wells cannot be a permanent decision, not for an industry that is just tentatively returning to growth.

By Irina Slav for Oilprice.com

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Stephen Olsen on January 06 2022 said:

The largest earthquake in Texas history happened on August 1, 1931 with a magnitude of 6.0 and occurred 135 miles southeast of El Paso. A magnitude 6.0 earthquake releases 32 times more energy than a magnitude 5.0. This 4.5 magnitude quake was about 1/50th of the Texas 1931 earthquake in destructive power. My question is this. If injecting wastewater is lubing plates and faults and causing those same plates and faults to slide more easily, isn't it better to have more frequent smaller earthquakes than one way more destructive larger one?

DoRight Deikins on January 06 2022 said:

What a wonderful resource for the Permian, once we discover the economical methods of recycling it! Ay, the sorghum, the beans, the mesquite that we could grow!

Eric Scholl on January 10 2022 said:

Recycling water is the right answer, on two accounts: earthquakes and human survival.
Water is imperative for people in the bone-dry Permian Basin.
Aquifers in this area (Pecos Valley, Edwards Trinity & Ogallala) only can produce so much water.
I used to think tornadoes were the most feared thing in the midwest until I experienced the 5.8 in

Oklahoma back in 2016...nowhere to run, nowhere to hide.